

Vol. XII. No. 1.

⁴ January, 1903.

THE AMERICAN

X-RAY JOURNAL

A MONTHLY
DEVOTED
TO THE
PRACTICAL
APPLICATION
OF THE
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AND TO THE
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PUBLISHED MONTHLY BY THE AMERICAN X-RAY PUBLISHING COMPANY.

Editor, **T. PROCTOR HALL, A. M., Ph. D., M. D.**

Managing Editor, **H. PRESTON PRATT, M. D.**

SUBSCRIPTION RATES—IN ADVANCE:

United States, Canada and Mexico.....	\$3.00	Foreign Countries.....	\$4.00
Single Copies.....	50	Single Copies.....	60

Contributions of Original articles and other matter relative to X-Radiance and Electrotherapy, of interest to the medical profession, are solicited from all parts of the world. Contributors will be furnished extra copies of the JOURNAL containing their articles at cost of publication.

Entered at the Postoffice at St. Louis, Mo., as Second-Class Matter.

VOL. XII.

ST. LOUIS AND CHICAGO, JANUARY, 1903.

No. 1.

INDEX TO THIS NUMBER.

	PAGE		PAGE
Frontispiece, Dr. Pettyjohn.....	2	EDITORIAL NOTES—Continued.	
Treatment of Malignant Growths with the X-Ray. J. N. Scott.....	3	American Electro-Medical Society.....	22
The X-Ray in the Treatment of Intra-Abdominal and Other Deeply Located Malignant Growths. Clarence E. Skinner.....	6	Illinois State Electro-Medical Society.....	22
Practical X-Ray Diagnosis. J. Rudis-jicinsky.....	8	Static Electrotherapy.....	24
Lupus Vulgaris.....	12	The Size of Atoms.....	23
Epilation.....	12	Prostatic Treatment of Old Men.....	24
Epithelioma of the Tongue. Charles Dick-son.....	13	Electrical Treatment of Phthisis.....	24
Chicago Electro-Medical Society—Seventeenth Regular Meeting.....	17	Removal of Superfluous Hair.....	24
Therapeutic Value of Vibratory Elec-tric Currents.....	17	X-Ray in Therapeutics.....	25
The Improved Fluoroscope.....	18	Velocity of Roentgen Rays.....	25
The Psychic Effects of Electricity. T. Proctor Hall.....	19	X-Ray Therapy.....	26
Treatment of Malignant Growths by the X-Rays.....	21	X-Ray as a Therapeutic Agent.....	27
EDITORIAL NOTES:		Sunlight and Electricity.....	27
Dr. J. Rudis-jicinsky's Lessons.....	22	Sanatorium Treatment of Pulmonary Tuberculosis.....	28
History of Am'n Electro-Therapeutic Ass'n.....	22	Electricity in Tabes Dorsalis.....	28
		Cancer of Uterine Neck.....	28
		Electricity in Bright's Disease.....	29
		World's Fair, St. Louis.....	30
		CORRESPONDENCE:	
		X-Ray Burn?.....	31
		Magnetic Field Outside the X-Ray Tube.....	32
		NOTES:	
		Meeting of Chicago Electro-Medical Society.....	32
		Lessons on Electrotherapeutics.....	32

CONTENTS VOL. XI, No. 6.

Frontispiece, Dr. Goodspeed.....	1236	Chicago Electro-Medical Society—Sixteenth Regular Meeting.....	1252
Equi-Potential Surfaces in X-Ray Field, Jno. T. Pitkin.....	1237	Notes on Electro-Therapeutics, Elmore S. Pettyjohn.....	1253
How to Treat Cancer. H. Valentine Knaggs.....	1239	An X-Ray Expert for Chicago.....	1254
Program of Roentgen Ray Society Meeting.....	1242	American Roentgen Ray Society—Third Annual Meeting.....	1256
Practical X-Ray Diagnosis. J. Rudis-jicinsky.....	1243	EDITORIAL NOTES:	
Report of Cases of Cancers Treated by X-Rays. J. D. Gibson.....	1247	World's Fair Congresses.....	1264
		Roentgen Ray Meeting.....	1265
		CORRESPONDENCE.....	1265
		Treatment for Tuberculosis,	
		Sinusoidal Current,	
		Muscular Twitchings,	
		Flickering Tube,	
		Electricity in Goitre.	

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VOL. XII.

ST. LOUIS AND CHICAGO, JANUARY, 1903.

No. 1.

Technique of the Treatment of Malignant Growths with the X-Ray.*

BY J. N. SCOTT, M. D.

Lecturer on Electro-Therapeutics, University Medical College, Kansas City, Mo.

The object of this paper is to open up a discussion on the comparative value of the different methods of applying the energy obtained from an active Crookes tube for therapeutic purposes.

I think the members of the medical profession who are making a specialty of the application of the radiance are fairly well agreed on the greater portion of the technique, but there is much difference of opinion as to the details, which, however, are important, as success or failure may depend on them in cases in which this method offers the only hope of curing a disease or prolonging life.

The apparatus used should be powerful enough to excite the largest tube to its full capacity, and should be so constructed that the current is under absolute control, so that a given quantity of current, length of spark gap and rate of interruption can be obtained at any time.

I use both the coil and the static machine. My coil is capable of giving an eighteen inch spark of large volume. It takes from three to ten amperes at 110 volts of the direct current. A series rheostat is used in the primary. The interruptor consists of a break wheel with brushes immersed in engine oil or alboline. It is operated by a motor with rheo-

stat by which any number of interruptions desired can be obtained. An adjustable mica condenser is connected across the brake wheel. Leyden jar condensers are so placed in the secondary that they may be switched in or out of circuit and used in multiple with the tube, or the induced current from the jars passed through the tube. There are adjustable multiple spark gaps on both the positive and negative sides of the secondary. They are made by screwing twelve brass balls one half inch in diameter and one-eighth of an inch apart on a strap of hard rubber, with a slide rod so placed that any number of them can be turned into circuit. A sliding rod is placed in multiple with the tube for determining the length of spark the tube will back up, and also for the purpose of taking part of the current from the tube when necessary.

With the above accessories I can operate many tubes effectually that could not be operated without the spark gaps or Leyden jars. Generally a high vacuum tube will operate better without jars, and with but few interruptions in the secondary current, but low vacuum tubes from which we wish considerable penetration can be connected with the multiple spark gaps. Tubes which are extremely low, and from which it is desired to obtain a moderate penetration can be connected with the Ley-

*Read before the Roentgen Ray Society, Chicago, Dec. 10, 11, 1902.

den jars in multiple, or to the induced Leyden jar current.

I do not believe there is a constant ratio of efficiency for photographic, fluoroscopic and therapeutic purposes. I often have a tube which will give a beautiful fluoroscopic effect of a particular part, but will not make as good a radiograph as some other tube which is inferior to it in fluoroscopic effect. Then there are other tubes which are efficient for radiographing but do not act satisfactorily for therapeutic purposes, when about the same thickness of tissue is to be penetrated.

At several different times I have used a tube on a malignant growth where I desired to penetrate a thickness of three inches. I would select a tube and adjust the vacuum so it would give a good fluoroscopic effect of an elbow of the same thickness as the growth. I would then use the tube for two or three weeks, but without beneficial effect. When I would change tubes, operating the second tube so it would give about the same penetration, the malignant growth would begin to improve in a very short time. At other times I would be obtaining satisfactory results from a certain tube, when it would get broken. I would then use a tube which would give nearly the same fluoroscopic effect, adjusting the vacuum so it would back up a parallel spark of the same length, but found that it would have little effect on the growth. In some cases the condition of the parts treated would grow worse until I again changed tubes. The tube distance was the same in all cases.

I have made many tests to try and determine what constitutes a good therapeutic tube before using the tube on a case, but without result. In order to avoid delays of testing a tube on a case to determine its therapeutic usefulness, I use a series of four or five tubes. I use one tube for a day, another tube the next day, and so on until I have used each, when I

begin over again. In this way, if one or two of the tubes should be deficient in therapeutic properties, the others which are good will average up the results.

I do not use different tubes for different classes of cases, and those requiring different degrees of penetration, but use an adjustable vacuum tube and regulate its penetration by vacuum adjuster, multiple spark gaps, Leyden jar condensers, etc. I use as low a vacuum as I can and be reasonably sure of penetrating the part under treatment.

I treat the majority of my cases every day. I have had much better success with the cases I have treated daily than those treated every three, four, or five days.

I never apply the ray strong enough to produce necrosis, as I think this irritates and stimulates the part of the growth which is not destroyed, and is liable to produce intense pain.

I begin with a short exposure, usually about four minutes if the anode of the tube is six inches from the part to be treated. I generally use the tube at about this distance. At the end of four or five days I increase to seven or eight minutes for four or five days, then decrease to four or five minutes for four more days. If I then observe no tanning nor inflammation, I increase to eight or ten minutes for four days. When reaction appears I decrease to three or four minutes until I find how long it will last, and when it begins to decrease I increase the exposure to six to ten minutes, depending upon the severity of the reaction and its duration. I then try to expose so I shall have a slight inflammation, but no necrosis.

If the skin is unbroken about the growth, I expose long enough to destroy the effects on the skin if it is healthy, and get as even an effect as possible thruout the growth.

In malignant diseases of the breast I expose from the front and side, then have the patient raise the arm over the head,

and expose the axilla, whether the involvement is perceptible or not. If the axillary glands can be felt I expose the glands in the neck and around clavicle. If the growth is in the abdominal region I begin the exposure on the side on which the growth is nearest the surface and continue until I obtain a slight reaction on the skin, when I decrease the time, as described above. If the first exposure was on the abdomen I then expose the back and side of the body nearest the growth.

When exposing large areas, and especially if the growth is breaking down, I watch the general condition of the patient, and keep all the eliminating organs active. I take the pulse and temperature of the patient every day or so, and if these rise suddenly, stop the treatment until they are nearly normal, and then proceed cautiously.

In order to protect both the patient and myself from the ray except where it is required, I have had a box, without top, constructed of copper, in which I place the tube. It is 30 inches long, 14 inches wide and 14 inches high. It is suspended from the ceiling by a cable, which passes thru two pulleys and is connected with a weight, which thus balances the box. By this method it can be easily raised or lowered as desired. Two cross pieces of fiber are placed in the box, which act as a tube holder. There is a door five inches square on the side, which can be opened for fluoroscopic work. The bottom of the box has an opening which can be made from one half inch square to seven by ten inches, by means of four slides. The box is made of No. 18 copper, and grounded to a waterpipe, so patient cannot obtain a shock by touching it. I have placed a mirror above the box in such a place that I can watch the tube by its aid, and still be protected from the ray.

I place the patient in a physician's chair, in a horizontal position, and lower the box to desired distance above the part to be

treated, and adjust the opening. If the area to be treated is very irregular I further protect normal parts by thin sheet lead.

I believe that all malignant growths which are operable, and in which the patient's condition will permit, should be operated on, and in all cases the ray applied immediately, daily, for a period of a month for small superficial growths, and as long as three months for the larger growths. If there are no signs of recurrence at the end of this time the ray can be stopped and the patient kept under observation for two or three years. If recurrence has made its appearance during the treatment the treatment should be continued for a month after all induration and visible growth has disappeared.

No difference how thoroly a growth has been removed, if it is shown to be malignant on microscopical examination, I think the surrounding area should be treated as above. The only exception to the above would be a growth on the face, in which the cure would be reasonably certain by the ray alone, and the cosmetic effect would be better than by operation and ray, but if it does not respond within thirty days it should be operated upon.

Inoperable growths of external origin, in which secondary deposits in internal organs cannot be determined, certainly should have a trial of the x-ray, as a certain per cent can be cured, and nearly all improved; pain lessened, and life prolonged.

Growths of internal organs which are not secondary will generally respond to treatment for some time, even years, and the growth disappear so far as can be made out by palpation. I hope some of the results will be permanent. I have several cases, in two of which an exploratory incision was made and the diagnosis confirmed by the microscope, one a sarcoma of the kidney, the other a carcinoma of the uterus, in which the patients have

regained normal weight, the cachexia has disappeared, and the general condition is good. In the patient with sarcoma of the kidney the hemorrhages have entirely disappeared and the man is working at his trade—that of carpenter—and has been for three months; says he never felt better.

In cases which are inoperable in so far as there is no hope of cure by operation alone, either on account of extent of growth or its location, but in which considerable of the growth can be removed by the knife, I believe much time can be gained by removing all the growth possible, if patient's condition will justify the operation; and then treating the remainder by the ray.

Some of the advantages of x-ray treatment over other methods are that we are not limited in the area that we may treat, unless it should be very large, so we can apply it to a sufficient distance surrounding the growth to include all.

I do not believe we would be justified in treating an area corresponding to more than one-fourth of the surface of the body, as it would destroy many of the sweat glands and might produce such an alterative effect that the eliminating organs would not be able to dispose of the destroyed tissues.

If care is used we can apply the ray to any organ in the body, whether vital or not. It can therefore be applied to parts

which can not be operated on, or if operated upon would cause the loss of a useful organ.

I believe the application of the ray to any part, whether malignant or normal, produces a rapid tissue change, and that new tissue replaces that which is absorbed; but that it produces a more rapid change in malignant tissue than in normal. However, if too much ray is applied, new tissue, whether malignant or not, will not form, probably on account of a trophic influence.

I believe our aim in treatment should be to produce the tissue change so rapidly that the malignant tissue will not reform as fast as absorbed, but not strong enough to destroy or absorb the normal tissue until new tissue can take its place. We have all seen the effect on healthy skin under daily exposure. The outer skin will die, become hard, and come away in large scales, but unless the process is carried on too fast, new skin will be formed under the old, and take its place before it is destroyed. However, if too much ray is applied, all the skin will be destroyed and even the underlying muscle, and healing will take place from the edges, but will be very slow, and it may take months for a small area to heal. I think this tissue change takes place in the deeper structures, only in less degree owing to the ray being weaker.

The X-Ray in the Treatment of Intra-Abdominal and Other Deeply-Located Malignant Growths.*

BY CLARENCE EDWARD SKINNER, M. D.
NEW HAVEN, CONN.

This paper was based upon an experience with thirty-eight cases of deeply-seated cancer in various localities, and all of which were inoperable because of

the advanced stage of the disease and offered a hopeless prognosis both as to arrest of the disease or the attainment of euthanasia under any other method of treatment.

Three of the cases were apparently

*Abstract of a paper read before the Roentgen-Ray Society, at Chicago, Dec. 10, 11, 1902.

cured; seventeen had been continuously benefited or were still improving with good prospects of ultimate cure; thirteen were temporarily benefited; two experienced no benefit whatever; and in three the treatment was discontinued by the patient before enough treatments had been given to indicate whether or not any results would have been produced. Relief of pain, improvement in the general condition, and lessening of hemorrhage where present, usually followed the x-ray applications.

The four hypotheses that have been advanced as explanatory of the beneficial influence which the x-ray exhibits in connection with malignant neoplasms were exhaustively discussed and compared with the clinical phenomena. These hypotheses were first, that the curative power is brot about thru a directly cauterant action of the rays; second, thru a directly destructive action exercised selectively upon tissues exhibiting a low degree of vitality; third, thru a destructive or inhibitory influence acting against a possible parasitic etiological factor; and, fourth, that cancer is simply a departure from the normal of developmental activity, resulting in a reversion of the normal cell type to one of a more primitive form, which aberration is dependent upon deeply seated constitutional factors and local irritation, and that the vibration of the x-ray is of such a nature as to be capable of influencing the molecular motion of the atoms composing the abnormal cells as to restore the normal characteristics of their developmental processes. Dr. Skinner inclines to the belief that the last is the true explanation, and discusses the clinical phenomena which support his views. He states, however, that there is

nothing in the history of x-ray therapy in cancer up to the present time which would conclusively exclude a parasitic element as an excitant of the local irritation.

The employment of surgical measures in combination with the x-ray is recommended under many conditions. The therapeutical relation of these measures to each other is described at length. Altho in most cases the judicious use of the rays appears to accelerate healing processes, yet the speaker cited cases in which the reverse influence seemed to obtain, and great caution was recommended in applying the agent to operation wounds before they had united.

The speaker prefers a static machine and a tube producing rays of high penetration for the treatment of deeply-located cancers, because it is possible with such apparatus to give longer treatments without calling up dermatitis than with a coil and slight penetrative power. Clinical results indicate at present that ray volume should be sacrificed to penetration in these cases. Ordinary gloves backed with rubber sheeting one-eighth of an inch in thickness are recommended for the protection of the operator's hands.

The paper concludes with the following paragraph which we most heartily endorse. "In conclusion I wish to state most emphatically that the therapeutic application of the ray should be intrusted, at the present time, only to the hands of operators who are skilled and experienced in this particular line of work, where it is possible to secure such, as the difference between efficient and faulty technique will frequently constitute the difference between success and failure in clinical results, as well as between safety and danger to the patient."



Practical X-Ray Diagnosis.

Prepared by J. Rudis-Jicinsky, A. M., M. D., M. E., Cedar Rapids, Iowa.

Revised by M. U. Dr. Joseph Hoffman, Vienna, Austria.

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Lesson 19.

Deformities and Diseases of Bones and Joints.

In order to determine a diminution in thickness, destruction, deformity, or any other disease of bones with impairment of function or interference with growth, in addition to other methods of examination skiagraphs should be made in every instance. Such pictures always will show the true condition, and help us to make a diagnosis earlier than the old way.

When the shadow of the bones is uneven, shows transparency at some places or very light or dark lines in any direction, the shaft with depressions, projections, or elevations, marked haziness at those places where the bone is not normally thinner, or gives irregular black spots with bright reflex around, or circumscribed spot of bright reflex with irregular lines around, we know at once that there is some lesion. To make a correct diagnosis we compare the bone examined with the normal shadow of a normal bone, see if the reflex is abnormally clear or if there are spots here and there, and if the internal structure and the substance are clearly defined in the midst of an area of dense shadow we may locate thus the size, degree, position, and relation of the whole areas diseased.

In this way we can study any thickening of the osteogenetic layer of the periosteum, see periosteal abscesses or nodes, and after incision observe the progress of the treatment, especially when iodoform is used, which gives an x-ray shadow. Osteitis, scrofulous, syphilitic or rheumatic; osteoporosis; osteitis deformans; necrosis; caries; or any localized collection of pus; may be made out on fluoroscopic examin-

ation by the general clouding of the area seen. Osteomas, osteochondromas, osteosarcomas and enchondromas may be well distinguished. If subcutaneous drilling or scraping is necessary, if bone chips are used, or iodoform-glycerin injected into tubercular joints, the progress of repair may be well observed during the whole treatment. In osteomyelitis the bone filling, the medullary canal, any suppuration, caries, necrosis, separation of epiphysis, or pyarthrosis with an abscess or tubercles, are diagnosed readily. The skiagraph would show plainly individual areas of osteoporosis, perhaps beginning osteosclerosis, purulent periosteal excavation, and possibly epiphyseal separation or pathological fracture in bone necrosis, giving to the surgeon the best evidence whether an operation is necessary or not.

The x-ray appearance of caries is dark shadows corresponding with the size and location of the area diseased. The shadows may be round, even or irregular. Death of bone in mass shows discrete shadows embedded in the shadows of the bones. These shadows may be dark, black, or, when the marrow cavity is filled with pus, show circumscribed shadows appearing as dark spots or when empty giving light areas corresponding with the density of the diseased bone. The texture and the shaft of the bone appear irregular, as does the marrow cavity. In syphilitic bone diseases the gummata may be studied well and the nodes discovered, which with all other symptoms, history of the case, etc., completes the diagnosis. Cranio-tabes or any other wasting of bones, alterations in the epiphyseal cartilages, or any other form of bony projections, about the

anterior fontanelle and on the tibia and humerus in children, can be seen fluoroscopically. Osteomalacia, characterized by general softening of the bones, gives light shadows in some places, or even translucency with comparatively darker shadow, medullary tissue, with all the destruction, fractures or deformity. The same is true in fatty degeneration. Any sequestration or general induration of soft parts may be observed and tuberculous foci found on x-ray examination. If necessary, the blood, bacteriologic and any other examination may be made for differential diagnosis, supplementing more detailed history-taking and more thorough clinical examinations.

In Pott's disease the angular deformity of the spine, in children especially; caries of the vertebrae; the irregular white lines of the intervertebral cartilages; ankylosis; abscesses; the region and the progress of our treatment when a plaster jacket is applied; may be observed and studied. Softening and distortion of the shafts of the bones in rickets with the direction and exact location of curvature of the spine. In obstetrics the rachitic pelvis gives an interesting object for skiagraphy. If tubercular, the isolated foci of the infection may be shown, and the irregular destruction of the bone tissue is seen in marked contrast with the normal shadow of normal bone. Besides the bone reproduction in all cases a bone sarcoma and benign osseous cyst may be readily differentiated, giving translucent areas irregular in the first, and well marked and regular in the second.

In coxalgia we decide at once whether it is femoral, acetabular or arthritic; how far fixation of the joint has progressed, with the compensatory curvature of the spine; or later see if there is a backward luxation of the femur. In these cases we have to remember that acute rheumatism never assumes the grave aspect of a septic infection, suppuration does not take

place, and more than one joint is attacked. The leucocyte count is less in rheumatism than in osteomyelitis, where again pain is referred more to the shafts of bones. The skiagraph of a case of acute rheumatism would show nothing except perhaps the circumarticular and intra-articular exudation. Further, in all these cases to make a differential diagnosis we have to consider the absence of high temperature in tuberculous epiphysitis, syphilitic osteochondritis, scurvy, and sarcoma. In osteomyelitis again we have sudden onset, and the skiagraph will show the usual limitations of the osteomyelitic process. The onset in tuberculous joint disease is slow, and the skiagraph will localize the disease in the epiphysis. In tuberculous bone disease the leucocytosis is negative prior to abscess formation. In scurvy we may have epiphyseal separation, but will not see any osteoporosis, and in osteosarcoma the x-ray picture would show no tendency to involucrum formation, but as stated already, translucent areas of irregular osteoporosis.

The differential diagnosis of sprains and dislocations from fracture is very easy with the x-ray, but we may find that very often a "simple sprain" is a fissure-fracture of such a nature that the old means of diagnosis could not detect it at all. The wounds of joints, synovitis, arthritis, sacro-iliac disease, white swelling of the knee joint, rheumatoid arthritis, ankylosis, if bony or fibrous, talipes and loose bodies in joints, may be studied very nicely with the x-ray, and the diagnosis made positive. Exostosis in the bones, myositis ossificans, acromegaly, hemorrhage into the joint, may be diagnosed very readily, and the joint affections in locomotor ataxia with its osteo-fibrous growths within the capsules of the joints, studied plainly. There is no question that there is a large number of injuries to the bones and joints which in former years could not be diagnosed properly, but the

x-rays show always the conditions as they are, and do it without any special regard for great authorities and skilful experts in fractures. To make a correct diagnosis it is necessary to make at least two exposures in different positions in each fracture, but in the injuries to joints I would advise the operator to make a skiagraph of the normal joint also, at the same time, in the same position, and with the same projection for comparison. When the fluorometer is employed we get exact measurements besides the proper localization.

In ankylosis the x-rays decide always whether the fixed posture of a stiff joint, due to fracture or disease, is produced by a growth of an excessive callus, a deposit of earthy salts, or a growth of soft tissue, which all may equally obstruct its movements, while one is far more difficult to relieve than the other. The bony adhesions are opaque to the rays, and the fibrous bands are transparent, so the positive diagnosis is made very easy.

Lesson 20.

Soft Tissues, Examinations and Location of Organs.

The examination of the soft tissues is very interesting, especially in negatives which have been under-exposed. They are usually full of delicate ghost-like yet clearly defined outlines of skin, muscle, tendon, and sometimes veins and arteries, and where there is disease it may give us a different shadow, and locate the area over which the disease extends, if we know our normal shadows of the soft tissues or the organs first. To light and pose the subject properly is the most vital part of the photography of the invisible, and to read and interpret the different shadows correctly is the most important thing in diagnosis. The observation, examination, location and measurement of different organs with all the pathological conditions in function, etc., may be

made with the fluoroscope and the organs plainly shown in outline and mapped out in relation to the usual landmarks, with more or less indistinctness. For permanent record we have the skiagraph, but both examinations are useful, and the results of the two in some cases confirm each other. Personal experience in examining plays certainly the main part.

The thorax is a region singularly adapted for examinations, and here the fluoroscope, or a flexible screen, is sometimes superior to the dry plate, on account of the movements of the heart, lungs, and diaphragm. For demonstrations in a room where all the light is excluded, a screen large enough to show the whole chest may be used, or the stereoscopic fluoroscope. Rollins' seehear in this and similar cases is also handy. An intrathoracic growth or aneurism may be found, in case nothing definite is shown by strictly lateral examination of the chest, if we make a skiagraph, and know our shadows, remembering that the normal lung tissue is transparent. Appearances in disease result from two simple factors—shadow and motion. I am accustomed to make my physical examination first, then the fluoroscopic, and the skiagraph later if necessary. The clothing of the patient is removed. The heart is examined from the front, and the great vessels from the back of the chest, turning the patient laterally, if necessary, with his arms upraised. In examinations of the lungs or pleural affections the patient should be examined while lying down as well as while standing or sitting on a chair without back.

In examinations of the lungs we have to observe carefully any deviation or compression of the whole cavity, and the visibility, position, form and motion of the diaphragm. This will help us to estimate the extent of any pulmonary disability, and give the first real sign of disease, when all other signs are wanting. We may rec-

recognize the range of movement in ordinary and in forced respiration, and any restriction is most likely to mean tuberculosis, pneumonia, pleurisy, or some other affection.

I would summarize the results of my own investigations as follows: Normal lungs are transparent (mark the rules given in the lesson on normal anatomy). Pneumonia in the first stage gives a shadow which resembles that of tuberculous infiltration but is not so marked; in the second stage the shadow is the same as in tuberculous consolidation, but clearer; in the third stage the same shadows as in first stage. In emphysema the reflex is abnormally clear. In asthma the reflex is abnormally clear and the movement of the diaphragm restricted. Pleural effusions are shown in black shadows, the upper level of which may be agitated by succussion. Pleuritic thickenings show dark. Pleuritic thickenings over consolidated tissue show darker spots in the field of a marked shadow, especially at the lower portion of the lungs. Tuberculous infiltration is indicated by slight haziness in the beginning, enabling us to recognize more fully and accurately the degree, position, and relation of areas diseased which may or may not be accompanied by dullness. Tuberculous consolidation gives decided shadows. A cavity shows a circumscribed spot of bright reflex, with an irregular line around whose extent is in direct relation to the comparative density of the shadow thrown upon the plate of the fluoroscope or the dry plate while the patient holds a deep breath. They may be located also in the midst of an area of dense shadow. Examine posteriorly and anteriorly, going carefully over the whole field. If a skiagraph should be made, put the patient on his back over the plate, the tube being in the median line over the fourth and fifth ribs. Isolated foci of infection show slight haziness over small spots, clearly defined.

Healthy tissues allow the ray to pass freely. The skiagraph is made, according to the location of the foci, with the plate anteriorly or posteriorly, the lesion being as near as possible to the plate. Adhesions are opaque, and fibrous bands transparent. Destruction of the lung tissue would be distinguishable, just as well as any other abnormality in size, etc., from the surrounding shadow, by a line of demarcation. Abnormal concretions appear about as opaque as bones. Foreign bodies are black, if metal, glass, lead, etc.

In examining the heart keep in mind all those rules laid down in the lesson on normal anatomy, its visibility, position, size, form, and movement. Hypertrophy, dilatation of aneurism of either ventricle or auricle may be seen and measured. Skiagraph anteriorly, patient lying over the plate. Pericarditis with effusion may be demonstrated nicely by screen or plate. An aspirating needle may be introduced into the sac, while observed on the screen. Calcification of the aortic wall and calcareous deposits on the valves may be made out.

Foreign bodies in the esophagus, stricture, and dilatation of the stomach can be detected fluoroscopically. In a stricture or dilatation of the stomach Tureks' gyromele will locate the site of the obstruction, and give us the size and movements of the stomach. Intestinal obstruction can be detected by giving an insoluble capsule containing a lead shot to the patient. The lead will show on the skiagraph, which has to be taken anteriorly.

The abdominal viscera are photographed with difficulty. The intestines and the stomach may be distended with gas, as stated already, and give a satisfactory picture, especially in children. But biliary calculi, and stones in the kidneys, ureters, and bladder, dermoid cysts containing bone or other opaque substances, and the

bones of a fetus, may be successfully skiagraphed. The stomach and the bowels should be emptied before examination. The distended cecum and ascending colon, the enlarged liver or kidneys, may occasionally show upon the plate. The distended rectum and sigmoid flexure are not difficult to bring out. When skiagraphing renal calculi, give purgatives before examination, place the patient on his back on a large plate. The tube should be in the median line about 15 inches above the abdomen. Make a few exposures with low and high vacuum tubes, compare both kidneys, and ureters, and if necessary, put the tube in such a direction as to avoid the great bones. Take the same plan with vesical calculi, but do not be deceived by scratches, air bubbles and spots

of a defective plate. The correct reading of the shadows of our pictures is not always an easy task, and every skiagrapher with proper aspirations should place a high standard in this regard before him, and make every exertion to reach it. It is better to aim high, and to be content with only the highest and best. Every one of us will judge for himself whether he is to content himself with mere routine or aspire to artistic and scientific productions. The times call for work of high order, further research, and further experimentation. If you use your judgment, study and try to make a careful execution in your applications you get results which will satisfy you and all of us who try and try again to do the best possible.

Lupus Vulgaris.

Dr. J. W. King of Bradford, Pa., reports a case of lupus vulgaris covering a surface as large as a silver quarter after a treatment of about one month, during which time he had administered several exposures from a Cromolume arc-light apparatus of from thirty minutes to one hour each; two x-ray exposures; and two applications of the static spray of thirty and twenty minutes, respectively, without producing a favorable result.

He then adopted a heroic measure, employing the x-ray from a tube which backed a four-inch spark-gap, for one hour. After this exposure no others were administered. A scab formed, and in a short time the spot had entirely healed. The doctor compares this to a case published in the April number of this journal by him in which case eight exposures had been made on alternate days of from thirty to forty-five minutes with the x-ray, in which the time had been thirty to forty-five minutes, at a distance of six

inches from the tube, without improvement. He then made one exposure of one hour, after which the recovery was complete. He therefore concludes that long exposures are essential to derive sufficient reaction to bring about a prompt recovery. —*Journal of Adv. Ther.*

Dr. G. Betton Massey advises that in electric epilation the platinum or gold needle employed should invariably be insulated. "This is easily done after a little trial by heating the needle over a flame and bringing it into contact with a piece of burning hard rubber. The coating thus applied may be immediately reheated and made sufficiently smooth and tapering to permit of the needle being inserted as usual into the hair sheath, the tip only being bare. Such a coating will last only about a half hour, when it should be renewed. With such a needle epilation may be accomplished with a smaller current, less painfully, and absolutely without an after-scar."

Epithelioma of the Tongue.*

BY CHARLES DICKSON, M. D., TORONTO, CANADA.

Electrotherapist to Toronto General Hospital, St. Michael's Hospital, Hospital for Sick Children.

My purpose in presenting this brief paper is to seek information rather than to impart it, for I must confess that I have come to our annual meeting with a liberal supply of interrogation points, eagerly desiring knowledge; hence, my paper should properly be entitled, "How may we best treat Epithelioma of the Tongue?" and I trust that the question will be answered by the association.

The question has been brought before me prominently by reason of four cases which have consulted me in the last five months, and more especially by the first of these, and the chief points of his history I shall briefly state.

On April 11, 1902, I was consulted by J. W., age forty-six years. About March, 1899, he noticed a lump on the right side of his tongue, towards the back of it, which was not very painful. It was operated upon by a confrere on April 25, 1899, and again on May 25, 1899.

At the end of February, 1902, another lump began to form at the junction of the anterior pillar of the fauces with the tongue, and was much more painful this time; the pain being steady and chiefly occurring at night, preventing sleep. Any motion of the tongue, such as eating, or even talking, now became painful.

I determined to try the effects of the x-ray on his case, and beginning on April 15, 1902, he was exposed to the radiance almost daily for some time, the length of seance being at first ten minutes, and later from fifteen to twenty minutes. The tube was placed about one foot away the first time of using, the distance was gradually decreased at future treatments, until the

globe was almost touching the lips occasionally.

For the first few applications a flat screen of thin sheet lead was used to shield the face, a hole being cut to correspond with the open mouth; then, a mask was constructed by coating a "false-face" with heavy tin foil, the lower jaw of mask being cut away and an apron of sheet lead substituted, both lips being protected by lead aprons. Next a funnel of lead for use with the mask was devised to hold the tongue to one side, and also to restrict the radiance to the parts affected. Then a self-retaining tongue depressor was tried with the mask. The location was by no means easy of access.

The patient reported that the first freedom from pain in ten weeks followed the second treatment, and that he had slept well for the first time since recurrence. This freedom from pain lasted for a couple of days, when the pain returned as severe as ever, but each treatment afforded some temporary relief.

On May 5 the lower jaw was rayed at about six inches distance. On May 20 less fetor was noticed; a slough came away during the evening. The following evening a second slough became detached and a comfortable night was passed.

On June 16, not being satisfied with the progress of the case, the x-ray was discontinued; mercurial kataphoresis was had recourse to about every other day—a zinc electrode being amalgamated with metallic mercury for the purpose—with a current strength of 10 ma. gradually increased to 20 ma. for fifteen minutes, and on the 17th and 19th, 10 ma. for ten minutes. On 20th the pa-

*Read at Twelfth Annual Meeting of the American Electro-Therapeutic Association at The Kaaterskill, Catskill Mountains, N. Y., on September 2, 3, and 4, 1902. From the Official Organ.

tient reported less pain, less swelling, and more sleep. Cocain anesthesia was employed at each treatment by means of a pledget of cotton wool saturated with twenty per cent solution placed against the affected portion of the tongue. On 21st mercurial kataphoresis, 30 ma. for five minutes and 20 ma. for five minutes; 23d, 10 ma. for ten minutes. On 27th he reported a good sleep for the preceding night and was able to take solid nourishment for the first time in several months, his breakfast comprising boiled eggs, bread, and butter. On July 2 the patient reports that he is sleeping much better, and on 9th he reports continued improvement in general health, that he has gained about ten pounds in the last two months, swallows better, sleeps better, and has less pain.

But, in spite of the cocain, the patient grew to dread the kataphoresis very greatly on account of the pain incurred at the time, and on July 30 this treatment was discontinued and the jaw rayed from the outside for twenty minutes at six inches range. The second raying afforded much relief from pain. The raying was continued on alternate days up to August 14.

But, as the disease seemed to be making progress and the pain increasing in severity, the mercuric kataphoresis was again resorted to on the following day, 15 ma. for five minutes and almost daily thereafter in addition to the x-ray externally for ten minutes, and the patient is still (September 3, 1902) under this treatment.

Immediately upon the appearance of an article by Mr. E. W. Caldwell on the treatment of malignant growths of the throat, rectum, etc., I ordered the tubes and shield described by him in the hope of improving my technique, but unfortunately, being a new form of apparatus, it has not yet been received.

The second case of this series of epithelioma of the tongue was referred to me by a confrère with the request that I should try kataphoresis, using a five per cent aqueous solution of chromic acid. The patient had already undergone raying by another confrère with the same result as my own, but in an aggravated degree, viz., much destruction of the substance of the tongue, with great enlargement of the glands, and swelling about the throat, rendering swallowing and speech difficult. On account of the great pain produced by the kataphoresis the treatment was only tried a couple of times, when the man declined further interference of any sort.

The third case of the series was sent to me for daily treatment by kataphoresis, which he received from July 1 to 16, using, on alternate days, five per cent chromic acid solution and a solution of arsenic four times the strength of Fowler's solution for ten minutes at a time, and varying the amperage from 20 to 30 ma., first applying adrenalin chlorid solution 1-1000, followed by twenty per cent cocain solution. It was impossible for the patient to remain long in the city.

In this case the trouble had only existed a few months, was not extensive, and was situated to the left of the frenum and beneath the front of tongue.

From July 8 to July 16 the latter half of each seance was occupied with mercuric kataphoresis, usually 20 ma.

No x-ray was employed in the case. The tongue was rendered very sore by the treatment.

A letter received the latter end of August states that the patient considers that the lump has disappeared completely, but that he will call for inspection.

For the fourth case of the series I am indebted to the same confrère as in the two preceding. In January last the right half of the tongue was excised.

About May 1 a lump was noticed at the angle of the right jaw.

From July 31 to the present time this gland has been rayed at close range thrice weekly. It has increased in size and is more tender than before treatment was instituted.

In my hands, hitherto, I have not derived from the x-ray that benefit in the treatment of epithelioma of the tongue that it has afforded in so many other malignant conditions.

Is this unsatisfactory result to be attributed to faulty technique on my part, or is my experience borne out by that of other members of this association? Cicatricial tissue exhibits a marked tendency to break down under the influence of the ray; perhaps results would be better in cases which have not been operated upon.

Again, what has been the experience of the members in regard to the employment of kataphoresis in this condition, *i. e.*, epithelioma of the tongue?

I would particularly ask the committee on kataphoresis what pressure is necessary to diffuse metallic mercury from a zinc electrode in the form of its salt into the living tissue? What is the correct strength of current to be employed in such cases, and what results can we reasonably expect? What is the correct technique to be observed? Is anesthesia by cocain kataphoresis the preferable method?

In a word, let me repeat my first question and ask for a very full and free expression of opinion on "How may we best treat Epithelioma of the Tongue?"

DISCUSSION.

Dr. G. Betton Massey said that a trace of copper or of tin would increase the amalgamating qualities of the zinc. He objected to the soft rubber insulation on the electrode presented by Dr. Dick-

son on the ground that it could not be readily sterilized. It was far better to freshly fuse sealing wax upon the instrument each time it was used. If the instrument were passed too slowly through the flame the mercury would be vaporized—indeed, this was an excellent way to get rid of the mercury when, for any reason it was not desired upon a metal instrument. The paper reminded him of two cases. One of these was a sarcoma of the base of the tongue. A strong treatment for those days (1898) was given with a current of 200 ma. for fifteen minutes, using a blunt and thoroly insulated electrode. The man was very much more comfortable the next day, and owing to the great shrinkage of the growth deglutition became less difficult. The second case was one of epithelioma of the tongue, the size of a quarter of a dollar, situated on the dorsum of the tongue, a little beyond the middle. The patient was a strong Irishman of alcoholic tendencies, so he took ether badly. He received a treatment with a current of about 400 ma. for half or three-quarters of an hour. The slough came away nicely, but a little point being left, a second application was made at the end of two weeks. The patient was placed upon a spring cot with a very large pad, connected with the negative pole, under the back. The other electrode was a blunt amalgamated zinc rod attached to the positive pole. The final result was a complete cure of the epithelioma of the tongue, a fact verified by Dr. G. G. Davis, of Philadelphia. One month later a lump developed in the glands of the neck, and the patient refused to be etherized or to submit to further treatment. When seen three months afterward, the growth was so large that the speaker hesitated to make use of the electrical treatment again. In a short time the man succumbed to the advances of the disease.

Dr. H. P. Pratt said that he had treated four cases of epithelioma of the tongue, and had succeeded in curing two cases. The other two died, as he now believed, because he did not know how to treat them. The first case was that of a physician living in Minneapolis. The growth had been examined by a number of pathologists, and had been pronounced an epithelioma of the tongue. She is at the present time perfectly well. The treatment consisted in opening the mouth, placing a celluloid speculum in it, and allowing the rays to strike the cancer. The treatment was given daily for five or ten minutes for a period of three or four months, and at the same time the x-ray was also passed thru both sides of the neck, the direction of the rays being frequently changed. He used celluloid because it afforded less resistance than any other material. He used it also in the treatment of vaginal and rectal troubles. In another case, after a time, he made use of the static breeze and this was followed by a rapid spread of the infection. It was for this reason that he had insisted, in a previous discussion, that the static breeze should not be used on muscular tissue.

Dr. J. D. Gibson said that on his way to this meeting he had seen an old sea captain in Georgia with a cancer of the tongue. The case was in a hospital and under the care of Dr. Daniels, and was said to be almost well. All enlargement had disappeared from the submaxillary and sublingual glands, and there was no open ulcer about the tongue. There was a large crucial cicatrix and the tissue around this seemed to be a little hard. The motion of the tongue was considerably restricted. He understood that the case had not been treated for twelve months, and the appearances indicated that it was not thoroly well;

nevertheless it was a very interesting result of x-ray treatment.

Dr. W. B. Snow said that he had had a good deal of experience with the brush discharge in the treatment of open surfaces, and he had never met with infection as a result of this; indeed, there should not be any such infection in the treatment of these open cases. He used the brush discharge for its tonic effect. By means of a special electrode which he employed the discharge could be localized to the desired part, and it was certainly an excellent antiseptic application. The patient should always be negatively insulated, the discharging rods widely separated and the electrode made of wood and the ordinary pointed one might be insulated by a tapering covering of glass when it was desirable to make the application within a cavity, as the mouth, ear, or vagina. He believed many cases of malignant disease could be as well treated thru the face, or from below, as by the use of a speculum.

Dr. Pratt said that he had used the same thing, even to the wooden electrode, but he had moistened the latter, and the patient had not improved under the treatment.

Dr. F. B. Bishop said that one reason that Dr. Dickson probably had not gotten more effect from his galvanic treatment was that his active pole had too much surface for the amperage—only 20. The surface used was sufficient for a current of 150 ma.

Dr. G. B. Massey said that long experience led him to absolutely agree with the remarks made by the last speaker.

Dr. Dickson said, in closing, that it had not been considered advisable to use more than a local anesthetic, and it was for this reason that this size had been employed.

Chicago Electro-Medical Society.

The 17th regular meeting of the Chicago Electro-Medical Society was held in room 912 Masonic Temple, Monday, December 29th, at 8 p. m., the president, Dr. Elmore S. Pettyjohn, in the chair. Minutes of the last meeting were read and approved.

Pursuant to notice given at the last regular meeting the constitution was amended by the addition of an assistant secretary and an assistant treasurer to the list of officers, and a scientific research committee to the list of standing committees.

The following new members were elected:

Dr. T. S. Middleton, Dr. W. T. Stewart, Dr. H. J. Stewart, and Dr. Gustavas M. Blech; and Edward W. Carr an associate.

Dr. T. S. Middleton read a paper on the Therapeutic Value of Vibratory Electric Currents.

Dr. T. P. Hall read a paper describing an improved fluoroscope which he exhibited to the members present.

T. P. HALL, M. D.,
Secretary.

The Therapeutic Value of Vibratory Electric Currents.

BY T. S. MIDDLETON, M. D.

(Abstract and discussion.)

Old ideas and old methods are continually changing. Where formerly bleeding and depletion were almost universal we now find remedies of an exceedingly mild type in common use. It is so with electricity. Instead of torturing and burning the patient by shocks and heavy currents we now seek to attain and do attain much better results with exceedingly mild currents. I have been able to obtain results little short of the marvelous

by using a vibratory current from the static machine when the disks are making only 20 revolutions per minute, with a current so mild that it would, to many operators, seem perfectly useless. My greatest success has been in acute and chronic nervous troubles, neuralgias, paralysis, douloureux, rheumatism, fibroids, etc. In treating I use my two hands as one electrode, grounding one pole and having the other connected with the insulated platform upon which the patient is seated.

Dr. H. P. Pratt remarked that a fibroid can be destroyed by Apostoli's method or by the x-ray, but that the current described by Dr. Middleton was entirely too weak to accomplish this result. This method of treatment was first described by Dr. Morton in 1881, and has since been superseded by the hyper-static machine.

Dr. P. S. Replogle said that if he could do as much as Dr. Middleton claimed to do he would quit the practice of medicine and surgery and take up electricity alone.

Dr. O. W. McMichael expressed the same opinion.

Dr. Pettyjohn agreed with some of the statements made by the speaker. A regulation of the generator is important. It is advisable always to use mild currents, and the vibratory currents described by the speaker stimulate metabolism. Static machines are useful but he had never found them to act twice exactly in the same manner.

Dr. Middleton admitted that the method was not new but claimed that it was more efficient and less dangerous than any other known method and required much smaller apparatus. He had had constructed a static machine small enough to carry around in his hand, which was driven by a spring motor and which gave excellent results. He was accustomed to

keep his machine in good working order by means of an electric fan which kept the machine clear of ozone. He invited those who doubted his results to come to his office and see for themselves.

The Improved Fluoroscope.

X-rays emanating from a Crookes tube are partly transmitted thru any substance upon which they fall, and partly scattered or reflected irregularly from not only the surface but every part of that substance. The resulting shadows upon the fluorescent screen or a sensitive plate are dimmed, because every particle of the substance under examination becomes a source of these secondary rays which spread a diffuse light upon the plate or screen. For this reason in photographing a thick portion of the body it is necessary, if a clearer image is desired, to screen off all rays except those which are necessarily required to give the desired shadow, and to place on the back of the sensitive plate a thick lead screen in order to prevent the same diffuse reflection from objects behind the plate.

It has not been found possible to diagnose thicker parts of the body so distinctly with the fluoroscope as by photography. This is partly due to the fact that a fluoroscope does not give a perfectly sharp image, partly to the fact that the eye is not as sensitive as the photographic plate and partly to the fact that no measures have heretofore been taken to shut off these diffusely reflected rays.

The fluoroscope which is here exhibited, which was designed by Dr. H. Preston Pratt and is the one exhibited to the Roentgen Ray Society at its Chicago meeting, has a metallic frame and is practically impervious to such scattered rays coming from the sides of the box. In making an examination with this fluoroscope, if an opaque screen with an opening large enough to expose only the parts

to be examined is placed between the body and the x-ray tube, it will be found that the image is very much sharper and clearer than that obtained from an ordinary fluoroscope used in the ordinary way.

In examining a hand or some other thin object with a low vacuum tube no particular difference is seen. But in viewing a hip joint with a medium high tube the difference is very marked. The x-rays from a high tube produce secondary rays of much greater intensity than those from a low tube. Some estimate may be made of the amount of illumination of the fluoroscopic screen, when a high tube is used, by covering the screen with an impervious lead plate in front and looking into the fluoroscope in a darkened room. The screen is then seen to be distinctly illuminated by rays diffusely reflected from the body of the observer and from surrounding objects. In the improved fluoroscope under the same conditions the screen appears perfectly dark. It is evident that such general illumination of the screen must obscure the fainter shadows and diminish the clearness of those that are stronger.

The improved fluoroscope has also a plate of glass between the barium platino-cyanid screen and the eyes, which serves to protect the latter from any minute particles which may be thrown off from the screen. It has also a valvular lid which closes the opening for the eyes so as to keep out dust when the fluoroscope is not in use. It is to be noted further that when the fluoroscope is standing screen downward upon a metal plate and the lid is closed the fluorescent screen is protected entirely from decomposition by x-rays, and is therefore likely to remain in good working condition much longer than the screen in the ordinary fluoroscope, unless the latter is kept in a lead box when not in actual use.

The Psychic Effects of Electricity.

BY T. PROCTOR HALL, A. M., PH. D., M. D.

Professor of Electro-Physics and Secretary of the Chicago College of X-Ray and Electro-Therapeutics, Secretary Chicago Electro-Medical Society, Professor of Electro-Therapeutics in the National Medical University.

The psychic effects of electricity are usually considered to be beyond either calculation or control. With most people to say "psychic" is to end the discussion so far as the scientific side is concerned. This view is incorrect. In recent years psychology has become a branch of natural science, and one with which every physician should have some acquaintance. The laws of psychological science are as definite as those of biology, and are as easily apprehended and applied.

By psychic effects I mean those involving the normal action of the central nervous system, with and without consciousness. Peripheral organs receive impressions through some form of physical force, the disturbances reach the cells of the brain or spinal cord and there produce effects which in turn act upon the rest of the organism.

Consider first the simple reflex result of sensation, whether consciously recognized or not. The remarks following apply to all sensations, but especially to those coming from the skin, namely, touch, heat and cold.

A very mild sensation is tonic. It stimulates all the efferent nerves, causes increased glandular activity in many cases, and contraction of the involuntary muscular fibers of the blood-vessels. The reflex effects are mainly local in the region of the stimulus. Congestive headache is relieved by lightly stroking the skin of the face and head. Bruises, before coagulation of the exudate, and swellings, are reduced by very light stroking of the skin over and about the swollen region for ten to twenty minutes. Pain in such cases, caused by the increasing pressure of the congestion, gives way as soon as the reflex stimulus begins to constrict the enlarged

vessels and the exudate begins to be absorbed. The mother who "kissed the spot to make it well" made her kisses therapeutically useful. These are common and well known illustrations of the therapeutic effects of very mild sensations.

Stronger sensations are irritant. The arterioles expand and hyperemia results. The increased blood supply may be therapeutically valuable in increasing the nutrition of that part.

Violent sensations injure the nerve centers and stop the efferent stimulus. The extreme results are shock and death.

Electricity, especially the static variety, may be so administered as to give almost any degree of sensation. A gentle static breeze will by its tonic action reduce an acute swelling and relieve pain like magic. If the breeze is from the anode this effect is reinforced by the astringent effect of the acid ions. A mild breeze from the kathode contains antagonistic elements; the sensation is tonic, constricting the blood-vessels; the electrolytic effect is to relax the blood-vessels; result, often nearly zero.

A stinging breeze or a series of sparks is irritating, inducing hyperemia of that part. It is reinforced by the chemical action of the kathode, and wholly or partly neutralized by the anode. If the anode is indicated in any case, a gentle breeze is also indicated, and a sharp or stinging application is contra-indicated. So also, if the kathode is used a strongly stimulating application of the current is in order, and not a mild breeze, unless the solvent effect alone is desired. If static sparks from the anode are made very sharp and painful, they may cause so much irritation as to overcome the astringent effect of the anions; but the effect is inferior to that of the same sparks from the kathode.

The sensations of the patient may thus be made to have great therapeutic value. In electrical treatment the physician can not afford to overlook them. Their regulation is easy; their results clear and definite. The condition of the end-organs of the nerves is subject to considerable variation. What is to one patient a mild stimulus may be to the same patient at another time, or to another patient, an irritant. A little care and attention will be required in adjusting the treatment to the patient's condition.

We come next to the more strictly conscious side, namely, the implanting of ideas or concepts in the mind of the patient, commonly known as suggestion. The implanting may result from verbal or written statements, from the general character of the surroundings, or from the manners of the physician or attendants. But in order to receive their full effect the patient must be in a receptive or mentally passive condition. If the patient is resolved to accept and carry out the suggestions of the physician, he might as well, so far as this effect is concerned, be resolved not to accept them. The essential condition is one of irresolution. It is generally useless to ask the patient to assume this condition. You might as well ask him to cure himself. It is a part of your business to bring about the receptive condition; and here is where the electrical apparatus is valuable.

To the patient the electrical apparatus looks very complicated. It is unfamiliar. The fiery streams themselves are disconcerting. He feels that he is upon strange ground; and among the terrors of the unknown he sees but one familiar masterly figure, the physician. This bewildered condition is one of those required for successful suggestion.

Use it, for the sake of the patient first, and for the sake of your own success and reputation also. The results are positive, definite, calculable, if you obtain this condition and make use of it. A very good

plan for the beginner is to explain to the patient the physiological effects of the currents he is using, and how they will effect a cure of the sickness. In this way you secure the intelligent as well as the subconscious co-operation of the patient's organism. The essence of "suggestion," however, is the positive assurance by the physician of the effects that will follow the treatment, or of the future course of the disorder, given in such a way as to be accepted by and deeply impressed upon the patient.

If the physician knows the pathological conditions, and applies his treatment scientifically, according to the known principles of electro-therapeutics, he is on safe ground and can bank upon the kind of results. This is just as true of the psychic part of the treatment as it is of the chemical and physiological.

The known effects of an electric current in or about its conductor are as follows:

1. Heat.—Every conductor is heated to some extent by a current, but therapeutically this effect is of no value. It may be well to remember, however, that a burn by accidental contact with a live wire is simply a burn, that is to say, complete or partial destruction of tissue by heat, and is treated in the same way as any other burn of similar nature and extent.

2. Magnetism.—This is not yet used to any extent therapeutically. In time, rapid reversals of magnetism may be found of value under some abnormal conditions of the tissues.

3. Induction.—When a positive current starts, very brief negative currents occur all round it; when it stops, equally brief positive currents occur round it. Rapid interruptions of a current or rapid alternations therefore produce rapidly alternating currents in the surrounding region, whose effects are similar to those of the Faradic current. Large coils of heavy wire are made, into which a limb or the whole body may be placed.

4. Electrolysis produces polar effects, at the kathode alkaline (solvent and hyperemic), and at the anode acid (astringent). Kataforesis is a variety of electrolysis, the basic ions (kations) moving down with the positive current toward the kathode, and the acid ions (anions) moving against the positive current toward the anode.

5. Stimulation is produced by changes in the current intensity. The more sudden the change the stronger the stimulus to muscles and nerves. A slowly intermittent current gives the best effect for muscles, allowing time for relaxation after each contraction. For the nerves no such relaxation is needed and the greatest result in a given time is obtained when the interruptions are rapid.

A smoothly alternating current (sinusoidal current) gives a minimum of nerve and muscle stimulus, and, on account of its changes of direction, gives no polar effects

such as are obtained by electrolysis with a direct current. The ions have scarcely begun to move apart when they are brot back by the reversal of the current. Instead of reuniting as they were before, the ions advance a little in the direction of the changes called "metabolism," which may be roughly described as oxidation. The sinusoidal current is an accelerator of tissue changes or metabolism.

6. Sensory Reflexes are induced by all kinds of sensations, as already stated.

7. Ideation or Suggestion has also been discussed.

Physicians as a class pay too little attention to the last two classes of effects. Those who realize their possibilities, however, are liable to go to the other extreme and imagine that all the effects of electric treatment are psychic. Probably half the effects of electric treatment, on the average, are and ought to be psychic.

Treatment of Malignant Growths by the X-Rays.

As a pain reliever in malignant growths, acute and chronic neuralgias, as *tic douloureux*, *hemicrania*, *coxalgia*, joint inflammations and gastric crises the benefits to be derived in at least 80 per cent of cases are as astonishing as they are satisfactory.

It is in those very disorders where we have hitherto been so helpless to achieve success that we find the x-ray treatment giving the most satisfactory results.

X-ray treatment seems cumulative, so that in cases where for any reason the patient is compelled to cease treatment and passes from observation, when seen after days or weeks of interval the changes which have taken place are delightfully surprising where the disease

has been checked or cured, or desperately embarrassing where a violent dermatitis has developed without having given a single sign of warning.

I would call attention to a fact, which if remembered may save humiliation and aid the operator to a more intelligent working knowledge. No one has yet referred to the fact so far as I know, yet it is none the less true that persons with blue eyes, light hair and fair skin are very sensitive to the x-ray, standing only very short exposures, and these with comparatively long intervals between the exposures. While dark haired, dark eyed brunettes seem quite immune to the perplexing and often distressing dermatitis, so treacherous in its onset and tardy in its departure.—The Medical Herald October, 1902.



Editorial Notes.

With this number ends the excellent series of 20 lessons on X-Ray Diagnosis, by Dr. J. Rudis-Jicinsky, which began in April last. The lessons have been much appreciated by our readers, many of whom are acquainted with Dr. Rudis-Jicinsky's excellent practical work.

Dr. Robert Newman in the *Journal of Adv. Ther.* for Dec., 1902, gives an interesting historic account of the American Electro-Therapeutic Association. The society was organized in New York, Jan. 22, 1891. The first annual meeting was held in Sept., 1891, with 44 fellows.

This society has done good work in stimulating investigation and bringing before the medical profession the possibilities and advantages that lie in electric treatment.

The next meeting will be held at Atlantic City, in September, 1903, under the Presidency of Dr. D. R. Brower.

American Electro-Medical Society.

On the evening of December 29th, there was organized in Chicago the American Electro-Medical Society, whose object is the investigation of electricity and allied sciences and the encouragement of their application to medicine and surgery by the formation of district and local societies. Temporary officers were elected as follows:

President, Dr. H. Preston Pratt.

Vice-President, the president of the Illinois State Electro-Medical Society, Dr. Elmore S. Pettyjohn.

Secretary, Dr. T. Proctor Hall.

Treasurer, Dr. O. W. McMichael.

After appointing a committee upon constitution and by-laws the society adjourned to meet at the call of the president. The

constitution recommended by the committee will be printed in our next issue.

The Illinois State Electro-Medical Society was also organized as a branch of the American Electro-Medical Society. Temporary officers were elected as follows:

President, Dr. Elmore S. Pettyjohn.

Vice-President, Dr. W. K. Harrison.

Secretary, Dr. Hamilton Forline.

Treasurer, Dr. P. S. Replogle.

A committee was appointed to prepare a constitution and by-laws and submit them at a meeting to be called by the president.

This society aims to unify electro-medical work thruout America, forming state and county organizations which are branches of the national society. Any physician in good standing, no matter what school he belongs to—since science knows no sect or "pathy"—may become a member of a local society, the state society and the national society for five dollars a year. The *AMERICAN X-RAY JOURNAL* is the official organ of these societies.

Previous to this there has been no organization of this kind. The American Electro-Therapeutic Association and the American Roentgen Ray Society are both national only, meeting but once a year.

The American Electro-Medical Society is broader in its scope and will cover the whole field of electro-medical work. Local papers and discussions do much to stimulate that, so that the members come to state and national meetings with ideas clarified, and prepared to join intelligently in the discussions.

Associate members are entitled to most of the privileges of active members. The state and national societies are controlled by a system of representation from the local societies, minimizing the danger of political or professional cliques controlling the larger societies.

Static Electrotherapy.

The principles of static electrotherapy may be stated in the form of a brief catechism as follows:

1. Is hyperemia of any part of the body required?—Use the kathode with sparks or stinging breeze.
2. Is hardened or proliferated connective tissue to be dissolved?—Use the kathode.
3. Is ischemia, or diminished blood supply of any part, desired?—Use the anodal breeze.
4. Is accelerated tissue change desired?—Use the sinusoidal current if these tissues are good conductors; otherwise, the x-ray.
5. Is the patient in a passive condition?—Use suggestion.
6. Are none of these effects desired?—Do not use static electricity.

The Size of Atoms.

A paper recently read before the Physical Society of London on this subject by Mr. H. V. Ridout, purports to compute the size of atoms with unprecedented accuracy, based on certain convenient hypotheses. Some of these hypotheses are, perhaps, more convenient than reliable; such, for instance, as that atoms are spherical in form, and that in water, hydroxyl and hydrogen atoms occupy equal volumes; or are marbles of the same size in contact with each other. This view of the atomic structure of water gives a mental picture of the substance resembling piled cannon balls. It is then, virtually, demonstrated in the usual manner that a sphere which, in free space would hold by virtue of its electrostatic capacity the same total quantity of electricity as the hydrogen atoms in a gramme of water, would have a diameter about one thousand times greater than that of the sun. In other words a cubic centimetre of water apparently stows away on its hydrogen atoms as much electricity as would be held by a sphere in free

space a thousand times bigger than the sun and charged to the same potential. As, however, the capacity of a free sphere varies as its radius while its mass varies as the cube of the radius; the charge per unit of mass varies inversely as the square of the diameter. Consequently, a simple calculation leads to the result that if the fine-grainedness of water is sufficiently great to permit of eleven millions of these billiputian marbles to line up in a millimetre, their electrostatic storage capacity in one centimetre cube of water would be equal to that of a single marble of a thousand sun diameters.

Since the thousandth of a millimetre is commonly called a micron (millionth metre), the millionth of a millimetre (billionth metre) may be conveniently called a bicon, and the result of the calculation is, therefore, that a linear series of 11.4 of these hydrogen marbles would fit in a bicon. Or, since a linear dimension of about one hundred bicrons is near the limit of visibility attained by the microscope, the diameter of a hydrogen atom would be about one thousandth times smaller than the microscope could render visible to the eye. Lord Kelvin's classical estimate of the size of atoms lay between a bicon and the tenth of a bicon; so that the lower limit of Kelvin's estimated range is about the same as that deduced in the paper here referred to. Of course the present limitations of knowledge in regard to the structure of matter prohibit any such computations from entering the regions of precision. All we can perhaps be permitted to say at present is that atoms of hydrogen approach a bicon in size.

In our last issue, we printed an article by Dr. S. N. Taylor, dealing with the measurements of corpuscles or chips of atoms. According to the results of the various measurements there described, a

corpuscle is a much smaller quantity of matter than an atom, and whereas atoms of different chemical substances have different masses and occupy different volumes, the masses of corpuscles of different chemical substances appear to be the same. A chip of a hydrogen atom cannot be distinguished in its behavior from the chip of an aluminum or oxygen atom. In particular, the mass of a hydrogen corpuscle comes out only about one thousandth part of the mass of a hydrogen atom, and this is derived not from a single experiment conducted in a particular manner, but from numerous experiments made in very different directions. Consequently, if the size of an atom may conveniently be expressed as a fraction of a micron, it would seem that the size of a corpuscle may conveniently find expression in *bicrons*.—*Electrical World and Engineer*, Nov. 22, 1902.

Prostatic Treatment of Old Men.

Twelve cases are reported successfully treated with the galvanic current by Dr. H. M. Weed, of Oshkosh, Wis., in the *Med. Mag.* If the prostate is soft he uses the anode in the urethra, insulated except in the prostatic region, 10 ma. for 10 minutes every few days. When the prostate becomes firm he applies the kathode in the same way, coated with cotton wet with solution of potassium iodid; followed by the faradic current five minutes. The indifferent electrode is placed on the lumbar region or the abdomen.

Electrical Treatment of Phthisis.

Lagriffoul and Denoyes (*Archiv D'Electricite Medicale*) have shown that in the case of tuberculosis lesions experimentally produced in the guinea pig the action of high frequency currents is to retard or greatly mitigate the development of the disease. In the untreated animals which were used as control, the lesions revealed post mortem were much more extensive

and more advanced than in those treated electrically.

Chisholm Williams (*British Medical Journal*), in a paper on the treatment of phthisis by currents of high frequency and high potential, gives the results of the method as applied to forty-three severe cases of pulmonary tuberculosis in the human subject. Of these forty-three patients, forty-two put on weight and lost all symptoms, except in some few a slight cough. The average duration of the treatment was three months, and the sittings were from ten minutes per diem upwards. —*Pacific Coast Journal of Homeopathy*.

The Removal of Superfluous Hair by a Combination of X-Ray Exposure and Electrolysis.

By David Walsh, (*Lancet*, November 2, 1901).

Some time since it occurred to the writer that a combination of the two methods of focus-tube exposure and electrolysis might be of advantage. He found the following method useful where the growth is not too thick. The exposure to the focus-tube is made in the ordinary way, and a week or ten days later, when the hair becomes loose, each hair is extracted and the electrolysis needle is passed into the follicle. This method means that a large number of electrolytic punctures must be made in a small area. However, with a little management the removal may be made to extend over a couple of days, and in that way it is possible to remove, so to speak, alternate hairs. Sometimes a second exposure to the focus-tube is needed before the hairs become loosened.

He finds this combined method useful in some cases, as it increases the chances of effectual cauterization of the emptied hair follicle. At the same time it shortens the period of depilation, but, like pure electrolysis, it should not be undertaken unless the patient has enough resolution and patience to undergo the requisite treatment.—*Interstate Medical Journal*.

X-Ray in Therapeutics.

Applied to an ulcer, it lessens discharge, and makes it purulent, followed by rapid formation of epithelium and a very soft, pliant scar.

There is danger in the ray, and in the hands of inexperienced operators it has produced disastrous results. Even the most careful application cannot always avoid a burn which is largely due to the fact that x-ray effects are so late in showing themselves that sufficient radiation to produce a burn may have been given several days before the burn appears, so that subsequent treatments have been cumulative. We are always trying to produce as much effect as possible without the burn, and since some cases undoubtedly do not show improvement until a dermatitis is produced we are on dangerous ground in every case.

The effects of x-ray applications persist for a long time after the treatments are discontinued and we must therefore not be too hasty in concluding either that there will be no good results or that our cures are permanent.

My conclusions are—

1. In superficial malignant growths, the certainty of cure by the x-ray is so great and the recurrences after operations are so frequent that it is at least an open question whether it is advisable to operate at all. Some of the men most experienced in the use of the x-ray are decidedly opposed to any operative measures.

2. In cases that can be thoroly operated upon I believe a short period of x-ray treatment before the operation is desirable to destroy the outlying portions of the growths; and knowing the frequency of recurrence after operation it is important to direct attention to the desirability of giving the patient every possible chance by the immediate application of the x-ray without waiting for any new growths to take place. The patient should then be carefully watched

and at the first evidence that the operation and x-ray treatment have been unsuccessful the treatment should be immediately renewed.

3. In large growths removal is desirable or establishing free drainage to prevent auto-intoxication, which is a very real danger in aged persons or those much debilitated as is shown by the number of patients who have succumbed to toxemia during treatment.

4. Inoperable cases should certainly be given the benefit of the x-ray for we have the reports of too many that have been relieved of pain, have had foul discharges stopped, hemorrhage lessened or stopped, and their lives prolonged and made comfortable, to refuse these sufferers any chance of relief.

Most important is the fact that some such cases have been permanently cured, and in affording these inoperable cases relief we shall give to some of them restored health.—W. P. Spring, M. D., in *Northwestern Lancet*.

The Velocity of the Röntgen Rays.

The theory of the Röntgen rays, which, up to the present, has received most general acceptance is that of Stokes. According to Stokes' theory, the Röntgen rays consist of irregular waves produced by the impact of kathode particles. The difference between Röntgen rays and light corresponds to the difference between noise and music as produced by sound waves. If this theory is correct, we should expect the velocity of Röntgen rays to be the same as the velocity of light. This has quite recently been shown to be the case by M. Blondlot, whose ingenious method of demonstrating this important result is described in the *Comptes Rendus* of October 27th and November 3rd. It is well-known that the Röntgen rays dissociate the molecules of air through which they pass, and thereby increase its electric conductivity. M. Blondlot took advantage of

this property to determine the velocity of the Röntgen rays. The rays were caused to act upon the spark gap of a Hertz resonator, excited by another spark gap, in parallel with and lying between the focus tube and an induction coil. By suitably regulating the spark gap of the exciter, it is possible to make the focus tube and the exciter work simultaneously, but the focus tube is extinguished immediately after the spark begins to pass, owing to the fall of potential between the leads. The E.M.F. at the spark gap of the resonator is a quarter period behind the current in the exciter, and, consequently, it is necessary to delay the extinction of the Röntgen rays at the resonator gap, if they are to have any effect in making the spark brighter. This may be done in two ways: (1) By increasing the distance between the resonator gap and the focus tube; (2) by increasing the length of the wires conveying the current waves between the exciter and the focus tube terminals. In the first case, the delay in the extinction of the Röntgen rays at the resonator gap is due to the time required by the rays to pass from the focus tube to the gap. In the second case, the delay is due to the time required by the electric waves to pass along the wires from the exciter to the focus tube. M. Blondlot adjusted the length of the wires and the distance of the focus tube till the maximum brightening of the resonator spark was obtained. Then he lengthened the wires and reduced the distance of the focus tube till the maximum brightening was again obtained. If the velocity of the Röntgen rays is the same as that of the electric waves in the wires, then the increase of the length of the wires should be the same as the reduction of the distance of the focus tube. Numerous experiments made by M. Blondlot showed these two distances to be practically equal. This shows that the velocity of Röntgen rays is the same as the velocity of Hertzian waves in a wire; and

the latter is known to be the same as the velocity of light.

The theory of Stokes receives strong confirmation from these experiments.

We have evidently of late been making some progress towards a knowledge of the real nature of the Röntgen rays, and M. Blondlot's experiments will undoubtedly contribute greatly to this result.—*Electrical Review*, London, Dec. 26, 1902.

X-Ray Therapy.

Dr. Freund, in his paper at the Dermatological Section of Seventeenth Annual Meeting of the British Medical Association, says:

Skin diseases suitable for x-ray treatment: Clinically, one group is separated from the rest, its essential feature being the removal of hair—*e. g.*, ringworm, favus, sycosis, hypertrichosis. In this class the x-rays are much more effective than light-rays, but both methods stand much on an equal footing in the remaining class of cases.

3. The depilatory properties of x-ray tube are due to direct destructive action or to alteration in the blood supply of the follicles. X-rays possess no bactericidal properties.

4. In the remaining group, cell infiltration and proliferation are essentials—*e. g.*, lupus, epithelioma, in which the destructive influence of the rays is beneficial. The rays also exert a powerful influence in promoting the formation of connective tissue and cicatrices. They may act also directly on the specific poison.

5. X-raying has a more penetrative effect than can be obtained by use of chemicals. The rays in weak doses stimulate and in strong doses destroy hair growth.

6. Comparison of x-ray method and Finsen's method for lupus vulgaris. On the whole, much about the same length of time is required in the two methods. The cosmetic results of both are equally

good. First x-ray large surfaces and treat remaining foci by Finsen's method.

7. Should tubes be soft or hard? The best guide is to be found, not in the estimated qualities of the tubes, but in the reactions actually observed. Practically identical results can be obtained from either hard or soft tubes by adapting the time of exposure, strength of current and distance of tube. Reactions depend largely upon idiosyncrasy, and again upon the parts exposed. Hard tubes are perhaps safer. With these the radiation can be pushed till visible effects are produced, whereas with soft tubes one must work more in the dark and make allowance for reactions before they are visibly manifest.

8. Clinical effects of x-raying: (1) Intumescence of the skin; (2) mild erythema; (3) pigment changes; (4) loosening of hairs; (5) subjective phenomena, itching and burning, etc.

Interstate Medical Journal.

The X-Ray as a Therapeutic Agent.

Dr. John H. Duncan, in the *Inter State Medical Journal* for October, 1902, gives a classified report of 43 cases treated by x-rays during the past year, including nine cases of epithelioma of the face, of which five were completely healed and the remainder much improved; five cases of cancer of the breast, with "most satisfactory" results in four, and favorable progress in the fifth; five cases of carcinoma of the jaw, neck and hand, two of which were cured; two cases of lupus vulgaris of the forehead, one of which is cured, the other improving rapidly; two cases of cancer in the mouth, no improvement; two cases of epithelioma of the neck, one cured, the other improved; cancer in axilla, improved; epithelioma of the external ear, much improved; cancer of larynx, no improvement locally, but patient feels better; melano-carcinoma of the back, died; rodent ulcer, some improvement, case con-

sidered hopeless and treatment stopped; lupus erythematosus, apparently cured; tubercular gland in neck, no improvement; cancer of penis, improvement at first, then stopped, considered incurable; cancer of nose and orbit, some improvement; eczema of the popliteal space, cured; hypertrichosis of the legs, cured; acne of the back, cured; cancer of the stomach, two cases, both died; cancer of the uterus, two cases, one died and the other is apparently healed.

Dr. Duncan states that he has kept a full report of his treatments, and in many cases the results seem to be as good as could be expected under the conditions. Other physicians, however, report marked improvement, including relief of pain, in even hopeless cases; and if the technique had been slightly changed we think Dr. Duncan's results might have been more favorable in this class of cases. As Dr. Duncan says, however, he began this work less than a year ago, and experience is needed in this as in any other department of medicine in order to obtain the best possible results.

Sunlight and Electricity.—Professor Garbasso, of Turin, in a note communicated to the *Nuovo Cimento*, describes the action of the sun on the electric spark. This has been already studied by Professor Manuelli, who observed that the rays of the sun, falling near the electrodes, favored the passage of the spark. According to Garbasso, even diffused light acts, and with greater effectiveness. In a first experiment he counted 24 discharges in 30 seconds in daylight, to 8 in the same time in the dark. Another experiment gave the figures 18 to 6. The effect of the light seems to last some time after the illumination. Experiments made successively with a lens and a concave mirror showed that by concentrating the light on one of the electrodes, an uninterrupted

current could be obtained even when the distance between the electrodes was sufficient to prevent the passage of any spark at all in the darkness. These properties of the sun's rays persisted after they had been passed thru quartz or Iceland spar; but a few sheets of mica, a plate of glass, or a cell 4 centimeters thick containing water or an alum solution, put a stop to the phenomena. These results seem to indicate that the Manuelli effect is due not to the presence of ultra-violet rays, but simply to the heating of the electrodes.—*The Literary Digest*.

At a stated meeting of the New York Post-Graduate Clinical Society, May 16, 1902, J. E. Stubbert, M. D., read a paper on "Some Practical Points on Sanitarium Treatment of Pulmonary Tuberculosis," from which we quote the following, which we believe accords with clinical experience:

"Superficial tuberculosis has been cured by the Finsen rays, but not as rapidly or as surely as when exposed to the x-rays; and, arguing from analogy, it would appear that the beneficial results obtained by the arc or Finsen light rays, in cases of empyema or any form of internal tuberculosis, should be much more decided, provided we can safely allow the x-rays to penetrate thru healthy to diseased tissues without interfering with the nutrition of the former. Thus far, we know that when the x-rays reach a pyogenic membrane, the discharge very quickly changes to a sterile one. This has been demonstrated in my hands in the treatment of lupus of the face and carcinoma of the fundus of the uterus. In the former, after two applications, the discharge was greatly decreased, and in the latter case the discharge disappeared entirely.

Whenever possible, pulmonary cavities, either of tuberculous origin or simple abscesses, should be exposed to the action of the x-rays.

The results that we should look for in

this treatment are: First, decrease in expectoration; second, disappearance of the various pus cocci; and, finally, disappearance of the tubercle bacilli. Decrease in cough would, of course, be a necessary accompaniment.

The same method of x-ray treatment can be applied to empyema cavities. Possibly, the x-rays may have an inhibiting, if not a resolvent effect upon infiltrations and consolidations without cavities."

Tabes Dorsalis.

The rationale of the action of electricity in tabes dorsalis is still unexplained and more or less empirical but it has always seemed to me that, reasoning by analogy, if its action in other affections stimulates nerve nutrition, increases the circulation in the part, enhances elimination and promotes normal function, it is likewise true and applicable in this disease and the pathological fact that degenerating nerve tissue must precede sclerosis may explain this action. In any event speaking clinically, that it removes anesthesia, improves muscular tone, increases the circulation peripherally, relieves pain, strengthens the bladder action and promotes well-being, is the daily observation of those who use it much in this affection. I am constrained to believe where used alone the results are not permanent, but when it is merely the part of seems to me there can be no question as a general system of treatment, its action is enhanced and made permanent.—*The Alienist & Neurologist*, St. Louis, August, 1902.

Cancer of the Uterine Neck with Comments on the Present-Day Teaching (Baldy, *American Medicine*, August 3, 1901).—Cancer of the neck of the womb is practically incurable. At the present time there is no cure for cancer short of surgery. Forming our own conclusions from the Johns Hopkins Hospital reports: There were 73 cases of cancer of the cervix operated on; 10 cases are alive today, or 20 per cent; but 8 cases

were rejected as non-operable, so that the true per cent is a little over 10. Of these 15 patients the diagnosis was only made because of the excellent care and skill exercised at Johns Hopkins, both clinically and microscopically, by as good experts as there are anywhere, so that in other sections of the country that per cent would not hold. Then these 15 patients, who are reported cured, 9 have only passed from 10 months to $2\frac{1}{2}$ years since their operation; only 6 are alive from 3 to 6 years after their operation. Who can say that every one of the 9 under $2\frac{1}{2}$ years will not die of the disease in the next $2\frac{1}{2}$ years? These same statistics report a number of cases who have died $4\frac{1}{4}$ and 5 years after operation. In view of these facts the real per cent would probably be 2 per cent. Winter's statistics show almost the same results when analyzed. In teaching, these statistics and the use of the microscope should be emphasized, i. e., there should be a full realization of the facts as they stand, and the importance of the early discovery of the disease must be insisted on. As soon as the diagnosis is made the case should be immediately hurried to the surgeon, for even with early operation only from 2 per cent to 5 per cent are cured. The clinical signs that are to be watched out for are, 1. A show of blood from the genitalia after the menopause, or if there should be a show of blood during menstrual life, that occurs between the regular periods. 2. A deterioration in the general health. The clinical symptoms should decide the operator, not the microscope alone; or in spite of the microscopical findings, if they are negative, and the symptoms are positive.

We commend the above statements to the attention of those surgeons (now happily few) who are opposed to experiments with the x-ray. Even in cases of internal cancer the per cent of x-ray cures reported is better than the best results here claimed for surgery, namely, 2 to 5 per cent.

With a little more experience there is no reason to doubt that when x-ray treatment is begun early a very large per cent of internal cancers will be cured.

Even benign growths have a way of submitting gracefully to the potency of this unknown quantity of the light world

(x-rays) e. g., enlarged prostates have ceased their worrying irritations, allowing the bladder and urethra to resume their normal eliminating function, the gland shrinking so that apparently a new lease of usefulness is given to these organs by these same rays.—Dr. Roland T. White.

Electricity in Chronic Bright's Disease.

The reconstructive influence of electricity on waxy or cirrhotic kidneys cannot be affirmed, but the evidences of its effects upon simple hyperemia, or upon inflammatory affections of the tubules or stroma, are many. My own observation and experience convince me that no other physical effect of electrization is better established than its influence over conditions of passive congestion. It sets up a sort of circulatory drainage that relieves congestive pressure. In renal congestion, where the uriniferous tubules are blocked by the products of inflammatory action, anything that heightens circulatory drainage increases filtration and directly relieves the burdened organs. It is a common experience that electrization does this, and so far forth may be relied upon to hasten the recovery of those cases that have not yet crossed the border line of incurable organic changes. Some time ago the writer reported five cases of renal disease, all of which had been under the observation and care of competent and careful physicians and by them had been referred for electrical treatment. Under persistent and regular treatment four of these cases completely recovered; the other, a chronic incurable, lapsing finally into insanity, received very positive benefit as manifested by increased well-being and the results of frequent urinary analysis.

I prefer the static wave current next, and perhaps equal in value to the static wave current is the high tension faradic current. Flexible electrodes are firmly

bound over the region of each kidney, and the strength of current gradually increased, almost to the point of discomfort, but not beyond the point of easy endurance. In other words, our aim should be to give strong rather than mild currents, and, too, the seances should be prolonged; from ten minutes, say, at first and gradually increased according to susceptibilities to three-quarters of an hour or more. In renal disease as in most other conditions where we wish to stimulate functional activity and improve nutrition, what are commonly called mild currents are, I am convinced, of little value. It is apt to be forgotten that the skin is the seat of chief resistance, and of pain in the passage of the current. With suitable and properly placed electrodes, however, the first is readily overcome and the second easily nullified, and the stronger the initial force, the denser the so-called threads of current that it is possible to concentrate locally.—A. D. Rockwell, A. M., M. D., in the *International Medical Magazine*, September, 1902.

The X-Ray in Cancer.—Dr. F. H. Williams, addressing the Academy of Medicine on this subject, said, in conclusion, that x-rays undoubtedly do good in cancer. Besides, they arouse no dread, hence patients will come for much earlier treatment than otherwise. There is no shock from their use, their employment is absolutely painless and the cosmetic results are better than from any other method of treatment. With regard to recurrence, one cannot as yet be sure. The x-rays, however, in this regard, certainly promise very well, and if there should be signs of recurrence one can promptly resume the treatment. With regard to internal cancer, the medical man is not justified in promising relief by the use of the x-rays; their employment may lessen discomfort, however, and all external cancers yield

absolutely to them. Inoperable cancers will become much more rare, because in very early stages malignant growths will be submitted to the x-rays.—The *Medical Times*, September, 1902.

At the convention of the Interstate Independent Telephone Association recently held in Chicago, a strong interest was aroused in the World's Fair of St. Louis, 1904, by the address of W. E. Goldsborough, Chief of the Department of Electricity of the Exposition. A brisk discussion was precipitated, as the result of which the following resolution was passed by the convention:

WHEREAS, The Interstate Independent Telephone Association appreciates the great opportunity that the St. Louis exposition affords for giving the independent telephone movement deserved prominence,

Resolved, The Interstate Independent Telephone Association favors holding its annual convention of 1904 in St. Louis,

Resolved, The Interstate Independent Telephone Association commends the St. Louis World's Fair to the support of the independent manufacturers of telephone appliances and supplies.

Tissue Changes Induced by the X-Ray.

Dr. A. G. Ellis is the author of a paper giving the results of investigations concerning these changes. Four cases are reported, in three of which microscopical studies were made both before and after exposures to the x-ray. The most interesting changes were noted in a scirrhus carcinoma of the breast, a portion of which had been given eight 10-minute exposures at intervals of two days, the remainder being covered by a lead shield. Softening of the exposed portion was noted after the fifth exposure. The entire breast was removed by operation and two

portions studied. The softening was found to be due to a cavity 1.5 by 1 cm. in dimensions, this containing a fluid showing many large cells the protoplasm of which was almost entirely filled by fat granules. Surrounding the cavity were necrotic portions of the tumor, the epithelial cells being granular and broken with destroyed outline and fragmented or entirely degenerated nuclei. The same degeneration, in varying degrees, was noted in the other cases, two squamous epitheliomas and an endothelioma. But little change was noted in one of the epitheliomas which contained a very large number of "pearls." A summary of the cases showed: (1) Necrosis of cells and trabeculae of vary-

ing degrees; (2) increase of elastic tissue in the three cases examined both before and after exposure; (3) a tendency to occlusion of vessels by deposits on their inner surfaces. This was marked in some instances, slight in others; (4) practically entire absence of infiltration by polymorphonuclear leukocytes. In regard to the claim of Beck and others that the changes in x-rayed tissue are due to obliterative changes in blood vessels the statement was made that while these changes probably occur they are not in proportion to the necrosis. This suggests the probability of their being results of the same influence instead of cause and effect.—*Medical News*, Nov. 22, 1902.

Correspondence.

DR. H. P. PRATT,

EDITOR AMERICAN X-RAY JOURNAL:

I have a patient whom, on Dec. 31, I treated for enlargement of prostate, using a celluloid rectal speculum; distance, 10 inches; time of exposure, 10 minutes; man on table in Sims' position. I followed this by a spray with static brush, on account of a "tender spot between the shoulders." This relieved his pain. In forty-eight hours he was taken with intense itching and burning all over his back, most intense about his shoulders. I used a lotion of carbolic acid and oxid of zinc with marked relief. At this time there was an eruption like scarlatina all over his back. Twelve hours later this was all gone and over the spine of each scapula was a copper-colored spot, one by three inches, with clear-cut edges not elevated, looking like an iodine stain. I gave him an ointment of subgallate of bismuth, which gave most relief of anything. Today, Jan. 8, the spots are desquamating, and itching is almost gone. The prostate is less and his urinary trouble seems cured; for the past three nights he has retained urine all night—a thing he had not done for two years. The day before the x-ray treatment he had taken 6 or 8 patent headache pills which he thinks may have contained quinine, which always causes hives in his case.

Now the question in my mind is: Did the pills cause the erythema and make the skin

more sensitive to the static brush, or was it a real x-ray burn. If a burn, why should it appear at such a distance, 33 inches from the tube, while parts in direct focus were only 10 inches from the tube?

What is the best treatment for x-ray burns? And would an x-ray burn heal as quickly as these spots are doing?

Is a tin screen effective, or is lead necessary.

O. E. C.

[Your treatment was good. It is not possible to decide the cause of the dermatitis. It was probably not an x-ray burn. It may have been caused by a drug, or by the static spray, which occasionally produces a burn like the x-ray.

For x-ray burns use some non-irritating anti-septic dressing, such as oxycyclorine or lysol, and cover with a layer of cotton. Some advise the anodal breeze to be applied over the cotton. The time required for healing varies with the extent of the injury and the condition of the patient, from a few days to several weeks.

Common "tin" is iron coated with tin. When thick enough to obscure x-rays it does very well for a screen. The cheaper

grades of "tinfoil" are lead. Several thicknesses, say one quarter millimeter in all, make a good screen for face work, tho the rays penetrate double that thickness to some degree. Pure tin obstructs the rays slightly, and is bad material for a screen.—EDITOR.]

The Magnetic Field Outside of the X-Ray Tube.

Radiating in every direction into space from the exterior of the excited Crookes tube as a common center, are innumerable lines of magnetism, the degree of magneto motive force thereof varying with the electro-motor force of the generator and the degree of exhaustion of the tube from which they emanate.

We may liken the atmosphere of the apartment where the Crookes tube is operated to a huge magnet whose positive pole rests upon the excited tube and near objects, while the negative pole rests upon the floor, the ceiling and objects that are more or less remote.

Good conductors of electricity placed within the magnetic field become electrified. If insulated from other objects they obtain a static charge, otherwise they become the seat of electrical currents, positive towards the tube and negative at points more distant.

Hence, if a resistance lamp, e. g., 32 C. P., is held in the hand of the operator with its base towards the apparatus it will become lighted with a glow proportionate to the strength of the magnetic field that surrounds it. A Leyden jar held in the same manner becomes charged, negative within and positive without.

The magnetic condition of the Crookes tube causes it to attract floating objects of the air to its exterior. A flexible sheet of writing paper will be bent to conform to the shape of the globe, to which it will adhere firmly, requiring some force to remove it therefrom, at the same time the sheet of paper will facilitate the working of the tube when its vacuum is very high for electrical penetration.

Like a magnet, the Crookes tube has a lifting power, but this portative effect is slight, only sufficient to hold light objects such as bits of tin foil, paper, a feather, dust, carbon, etc.

An oblong sheet of cardboard balanced upon the highest point of the tube will place itself in the magnetic lines of force and at right angles to the electrical discharge that takes place thru the interior.

A patient who is receiving an x-ray treatment or being radiographed will always be positively charged, and the operator negatively. A spark discharge takes place between them whenever they come in contact with each other.

A small Crookes tube the size of your thumb held in the hand of the operator by its cathodal extremity lights up and generates x-rays of its own, whenever it is introduced into any portion of the magnetic field of another Crookes tube of recent dimensions, that is in turn properly excited by a powerful generator.

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The next meeting of the Chicago Electro-Medical Society will be held in room 912, Masonic Temple, Monday, Jan. 26, 1903, at 8 p. m.

The next issue of this journal will contain the first lesson of the series of twenty-four lessons on the principles and practice of x-ray and electro-therapeutics. As this is now one of the most important branches in medicine, and the practitioner has been deprived of the advantages of special courses in this line of practice, these lessons will tend to enlighten the busy physician in its principles and practice without taking time from his business to complete a post graduate course such as would otherwise be required. Every physician, whether he expects to follow up this practice or not, should avail himself of this opportunity of mastering its underlying principles. This course will be thoro. It will embrace everything that any practitioner would require to make him conversant with the principles of the subject and give to him all the technique except the clinical practice which can only be obtained by everyday use. This course is worth \$100 to any practitioner. The lessons will not be theories alone, but will be built on scientific as well as experimental facts. There are many practitioners around the country who have numerous cases that are not amenable to medical treatment. With a thoro knowledge of electricity many of these patients would be greatly benefited, if not entirely cured.